

What is Claimed:

1. A system for allocating a supply of a component, the system comprising:

5 1) a database containing information related to said component, said information describing the supply and changes to the supply;

2) a supply planner, whereby said supply planner produces a supply plan using synchronized allocation.

10 2. The system of claim of claim 1, wherein the supply planner uses the following objective function:

$$\begin{aligned} \max \left[ \omega_{cs} \gamma_{cs} \sum_{i=1}^M \sum_{t=1}^T \delta_{it} x_{it} + \omega_R \gamma_R \sum_{i=1}^M \left( \alpha_i \sum_{t=1}^T x_{it} \right) + \omega_M \gamma_M \sum_{i=1}^M \left( \beta_i \sum_{t=1}^T x_{it} \right) \right. \\ \left. - \omega_I \gamma_I \left( \sum_{j=1}^M \left( c_j \sum_{t=1}^T I_{jt} \right) + \sum_{j=1}^M \left( c_j \sum_{k=1}^T \left( t_{jk} - \sum_{t=1}^T u_{jkt} \right) \right) \right) \right] \end{aligned}$$

wherein,

15  $\omega_{cs}$ ,  $\omega_R$ ,  $\omega_M$ , and  $\omega_I$  are the user-assigned weightings for customer service, revenue, margin, and inventory,

$\gamma_{cs}$ ,  $\gamma_R$ ,  $\gamma_M$ , and  $\gamma_I$  be the scaling factors for customer service, revenue, margin, and inventory,

$x_{it}$  is a binary variable,

20  $\delta_{it}$  is a scaling factor to give preference to shipping orders on-time versus shipping late or early,

$\alpha_i$  = revenue associated with demand  $i$ ,

$\beta_i$  = margin associated with demand  $i$ ,

$c_j$  = standard cost of item  $j$ ,

25  $u_{jkt}$  = quantity consumed inventory,

$t_{jk}$  = quantity of issued inventory,  
 $I_{jt}$  = inventory of item  $j$  at end of time period  $t$ ,  
 $M$  = number of independent demands, and  
 $T$  = number of time periods.

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3. The system of claim 1 further comprising a resource optimizer, wherein said resource optimizer uses matched sets logic.

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4. The system of claim 1 further comprising product attribute defining tool.

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5. The system of claim 4, wherein said product attribute defining tool allows a user to define a smartbill, whereby said smartbill defines the component by using an engineering specification.

6. The system of claim 1 further including a constraint-based master planner, whereby said constraint-based master planner allows a user to specify one or more goals to be considered by the supply planner.

7. The system of claim 6, wherein said goals comprise the maximization of Revenue, Margin, Inventory, and Customer service.

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8. The system of claim 1 further comprising a product change analyzer, wherein said product change analyzer compares the effects of a change in the supply at different times.

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9. The system of claim 1 further comprising a comparer, wherein said comparer assesses differences in a supply plan for the supply of the component and a supply plan for a modified supply of the component.

10. The system of claim 1 further comprising a resource

requirements planner, wherein said resource requirements planner suggests a change in the supply to address a shortage identified by the supply planner.

11. The system of claim 1 further comprising a finite resource planner wherein said finite resource planner suggests an optimal use of the supply to address a shortage identified by the supply planner.

12. The system of claim 1 further comprising a customer promiser, wherein said customer promiser

- 1) determines a remainder of the supply following implementation of the supply plan, and
- 2) accesses the feasibility of a new order using on the remainder.

13. The system of claim 1 further comprising an interactive master scheduler.

14. The system of claim 1, wherein said database comprises input data, user specified data, and output data.

15. A method for allocating a supply of a component, the method comprising the steps of:

- 1) forming a database containing information related to said component, said information describing the supply and changes to the supply;
- 2) producing a supply plan using synchronized allocation.

16. The method of claim 15, wherein said information defines the component using an engineering specification.

17. The method of claim of claim 15, wherein the step producing a supply plan comprises the use of the objective function:

$$\max \left[ \omega_{cs} \gamma_{cs} \sum_{i=1}^M \sum_{t=1}^T \delta_{it} x_{it} + \omega_R \gamma_R \sum_{i=1}^M \left( \alpha_i \sum_{t=1}^T x_{it} \right) + \omega_M \gamma_M \sum_{i=1}^M \left( \beta_i \sum_{t=1}^T x_{it} \right) - \omega_I \gamma_I \left( \sum_{j=1}^M \left( c_j \sum_{t=1}^T I_{jt} \right) + \sum_{j=1}^M \left( c_j \sum_{k=1}^T \left( t_{jk} - \sum_{t=1}^T u_{jkt} \right) \right) \right) \right]$$

5 wherein,

$\omega_{cs}$ ,  $\omega_R$ ,  $\omega_M$ , and  $\omega_I$  are the user-assigned weightings for customer service, revenue, margin, and inventory,

$\gamma_{cs}$ ,  $\gamma_R$ ,  $\gamma_M$ , and  $\gamma_I$  be the scaling factors for customer service, revenue, margin, and inventory,

10  $x_{it}$  is a binary variable,

$\delta_{it}$  is a scaling factor to give preference to shipping orders on-time versus shipping late or early,

$\alpha_i$  = revenue associated with demand  $i$ ,

$\beta_i$  = margin associated with demand  $i$ ,

15  $c_j$  = standard cost of item  $j$ ,

$u_{jkt}$  = quantity consumed inventory,

$t_{jk}$  = quantity of issued inventory,

$I_{jt}$  = inventory of item  $j$  at end of time period  $t$ ,

$M$  = number of independent demands, and

20  $T$  = number of time periods.

18. The method of claim 15 further comprising the step of optimizing the supply using matched sets logic.

25 19. The method of claim 15 further comprising the step of specifying

one or more goals to be considered in the step of producing a supply plan.

20. The method of claim 15 further comprising the steps of:

- 5 at a first time;
- 2) preparing a first supply plan for said first modified database;
- 3) modifying said database to reflect the change in the supply at a second time;
- 10 4) preparing a second supply plan for said second modified database;
- 5) comparing the effects of said first and said second supply plans.

15 21. The method of claim 15 further comprising the steps of

- 1) modifying said database to reflect a change in the supply;
- 2) preparing a modified supply plan for said modified database;
- 20 3) comparing the effects said supply plan and said modified supply plan.

22. The method of claim 15 further comprising the steps of:

- 25 1) identifying a shortage in the supply created in said supply plan; and
- 2) modifying said supply to address said shortage.

23. The method of claim 15 further comprising the steps of:

- 30 1) identifying a shortage in the supply created in said supply plan; and
- 2) modifying said supply plan address said shortage.

24. The method of claim 15 further comprising the steps of  
a) determining a remainder of the supply following  
implementation of the supply plan, and  
b) accessing the feasibility of a new order using on the  
remainder.

25. A program storage device readable by a machine, tangibly  
embodying a program of instructions executable by a machine to perform  
method steps of:

- 1) forming a database containing information related to a  
supply of a component, said information describing the supply and changes  
to the supply;
- 2) using synchronized allocation and matched sets logic to  
produce a supply plan for said supply; and
- 3) allocating said supply using said supply plan.